Appendix D
Restoration Statement of Work

Terrestrial Resource Injury and Restoration at the Oronogo-Duenweg Mining Belt Superfund Site Jasper County, Missouri

The Jasper County Natural Resource Damages Trustees (Trustees), through this Consent Decree and Statement of Work with the Settling Defendant, seek to compensate the public for injuries to natural resources; primarily terrestrial habitat for migratory birds, endangered species and other trust resources including State trust resources. The primary goal of this Restoration Statement of Work (RSOW) is to set forth the measures the Settling Defendant may undertake pursuant to the Consent Decree to restore terrestrial habitat to baseline conditions (primary restoration). All Primary Restoration Projects performed by Settling Defendant must conform to this RSOW to be eligible for Primary Restoration Project Credit or Long Term Monitoring & Maintenance Credit.

I. Soil Injury Assessment and Restoration Planning

A. Primary Restoration Project Plan

For each Primary Restoration Project that Settling Defendant elects to perform, it shall submit to the Trustees for approval a draft Primary Restoration Project Plan (PRP Plan) pursuant to Section XVIII of the Consent Decree. The PRP Plan shall at a minimum:

identify with specificity each Parcel on which the Settling Defendant proposes to perform primary restoration activities;

provide for the characterization of soil and mine/mill waste at all Parcels subject to Primary Restoration and require that the Settling Defendant collect soil samples from 0-3 inches deep, 3-6 inches deep, and 6-12 inches deep in transects that cover areas in and around former parcels and analyze for Zn, Pb, and Cd using methods and procedures as outline in the Consent Decree, Section VIII Quality Assurance, Sampling and Data Analysis;

set forth the terrestrial and riparian corridor restoration activities proposed to be performed in accordance with the specifications set forth below;

detail the biosolid source with nutrient content, carbon to nitrogen ratio, percent moisture, and priority pollutant analysis;

set forth the storm water management measures to be implemented;

contain a draft of each environmental covenant to be obtained; and

provide any maps, schematic diagrams or specifications necessary for implementation of the Primary Restoration Project in accordance with this RSOW.

Pursuant to Paragraph 60 of the Consent Decree, each Primary Restoration Project as set forth in a PRP Plan must be approved by the Trustees in order for the Settling Defendant to receive Primary Restoration Credit for the project.

B. Institutional Controls (i.e. Environmental Covenants)

For each Parcel on which Settling Defendant will perform a Primary Restoration Project which has been approved by the Trustees, the Settling Defendant shall obtain an environmental covenant pursuant to the Missouri Environmental Covenant Act (MOECA) §§ 260.1000 through 260.1039, RSMo. Each covenant shall be held by the Trustees or a third party designated by the Trustees. At a minimum, each covenant must:

Run with the land for a period of no less than 10 years;

Prevent development and restrict land uses to those consistent with preserving the restored land as wildlife habitat; and

Protect the riparian corridor from grazing, and other activities that cause destruction of habitat.

Settling Defendant shall record each covenant with the Jasper County Recorder of Deeds before or within thirty (30) days of payment of anticipated Trustee Oversight Costs pursuant to Paragraph 61 of the Consent Decree.

II. Habitat Restoration

A. Primary Terrestrial Restoration -Biosolid Amendment

In each Primary Restoration Project approved by the Trustees that Settling Defendant performs, Settling Defendant shall conduct primary restoration on all media (soil and/or mine/mill waste) where metal concentrations exceed 1100 ppm Zn. Primary terrestrial restoration will be implemented on covered mine/mill waste either at a soil cap or a capped pit, on transition zones that exceed Restoration Action Levels (> 1100 ppm Zn**)**, and on excavated areas (soil areas where mine/mill wastes have been removed).

Biosolids means the semi-solid residual materials from municipal wastewater treatment plants that use activated sludge treatment processes (also known as sewage sludge) or other composted, nutrient-rich waste products. In addition to biosolids, Settling Defendant shall add lime to the amendment mixture to keep the soil calcareous.

Settling Defendant shall also add carbon-rich matter, such as hay, yard wastes, wood chips, or sawdust, to maintain the proper carbon to nitrogen ratio within the treated soil.

Biosolid application must conform to applicable state and federal regulations. The Trustees will work with the Settling Defendant to comply with applicable local, state, and federal requirements. Biosolid application will only occur in cooler months between November 1 and March 31 to reduce odor. Settling Defendant shall submit information identifying each biosolid source with nutrient content, carbon to nitrogen ratio, percent moisture, and priority pollutant analysis to the Trustees in the PRP Plan. Biosolids from municipal sewage sludge sources must meet at least Class B specifications (40 C.F.R., Part 503). If Class B municipal biosolids are applied within one mile of a residence, Settling Defendant shall cover them with a soil cap or till them into the soil within fourteen (14) days of application. All other biosolid applications must be covered or incorporated into soil within thirty (30) days of application. All biosolids must be composted prior to final cover and planting, in accordance with the PRP Plan.

1. Biosolid Addition To Capped Mill Waste (Vegetated Chat, Chat, and Tailings)

In each Primary Restoration Project approved by the Trustees that Settling Defendant performs, Settling Defendant shall implement the following restoration activities in conjunction with the remedial action to cap contaminated chat and tailings. Restoration with biosolid amendments is designed to build a thicker soil profile, with subsoil under the cap that has been stabilized to reduce metal availability and improve the potential of the soil to sustain native prairie vegetation. The Settling Defendant will integrate biosolids application with the remedy by applying high-level biosolids, additional organic matter, and lime prior to placement of the soil cap. The amendments shall be incorporated into the mine/mill waste by tilling to a depth of one to two feet. The same approach will be used on subaqueous disposal sites. The Settling Defendant will then cover the biosolids application/mine/mill waste mixture, or integrate the biosolids with a soil cap, and seed as specified by EPA followed by overseeding with a native seed mixture the following year.

The Settling Defendant will incorporate biosolid amendments into capped mine/mill waste using the following ratio of materials:

Material	**Amount**
Biosolids	100 tons/acre
Carbon-Rich organic matter	50 tons/ acre
Lime	25 tons/acre

The Settling Defendant shall seed the restored land using the seed mixtures identified in Attachment 1 that are applicable for either upland sites or lowland sites.

2. Biosolid Addition To Transition Zone Soils or Excavated Soils in Excess of 1100 ppm Zinc

In each Primary Restoration Project approved by the Trustees that Settling Defendant performs, Settling Defendant shall incorporate biosolid amendments directly into injured transition zone or excavated soils (> 1100 ppm Zn) by tilling to a depth of approximately one foot. Settling Defendant will then seed the treated soil with a sterile grass for immediate vegetative cover. In the second growing season, the Settling Defendant shall re-seed the restored area with a long-term native species mixture (Attachment 1), with the residual mulch of the original sterile grass acting as protection and supporting the establishment of the long-term species. In the case where transition zone or excavated soils are re-vegetated as part of the remedial action, the Settling Defendant shall overseed with the seed mixture specified in Attachment 1 in the following year.

The Settling Defendant shall apply the following rates of biosolids and amendments to soils that are moderately contaminated with metals (between 6424 ppm Zn and 1100 ppm Zn):

Material	**Amount**
Biosolids	50 tons/acre
Carbon-Rich organic matter	25 ton/s acre
Lime	10 tons/acre

B. Primary Restoration of Riparian Corridor Injured During Remedial Action

The riparian corridor is defined for the purposes of this RSOW as an area within 50 feet of either side of an Associated Tributary. For each Primary Restoration Project approved by the Trustees that Settling Defendant performs where the riparian corridor is injured during construction of the remedy and/or where bank destabilization has occurred, the Settling Defendant shall undertake restoration of the riparian corridor as specified below:

- Site preparation (if necessary to support tree planting): Physical alteration and/or contouring, filling, and other appropriate actions.

- Tree planting at a rate of 676 trees per acre on 8' centers. Trees shall be native species suitable for riparian environments (willow, sycamore, cottonwood, river birch, etc.).

- Fencing to keep livestock out of the riparian corridor.

III. Inspection and Certification of Restoration Completion

A. Inspection

1. Pre-Final Inspection

Concurrent with the Pre-Final Inspection required for the RD/RA or at another time agreed to by the Trustees, a Restoration Pre-Final Inspection shall take place that includes the Settling Defendant and the Trustees. The findings of the Pre-Final Inspection, including any outstanding construction details, re-vegetation needs and a plan to resolve outstanding restoration needs, shall be documented in a Pre-Final Restoration Inspection Report, due within thirty (30) days of the Pre-Final Inspection.

2. Final Restoration Inspection

During the latter part of the second growing season after initial vegetation (July-September the year after the first growing season) a Final Restoration Inspection shall occur, which includes the Settling Defendant and the Trustees. The Final Restoration Inspection will evaluate whether restoration is complete. If additional re-vegetation or other restoration needs are identified, the Settling Defendant must address the remaining issues and notify the Trustees to schedule a re-inspection.

B. Restoration Completion

Within sixty (60) days of the Final Restoration Inspection, the Settling Defendant shall submit to the Trustees for approval a Certification of Restoration Completion. The Certification of Restoration Completion shall document the restoration activities completed at each Parcel and identify any apparent initial maintenance measures needed to maintain the terrestrial habitat. The Trustees may approve or disapprove the Certification. If the Trustees disapprove the Certification they shall notify the Settling Defendant in writing of the reasons for such disapproval and shall give the Settling Defendant an opportunity to correct any deficiencies.

IV. Long Term Monitoring and Maintenance

Pursuant to Paragraph 63 of the Consent Decree, within 15 days of receiving its Certificate of Completion for a Primary Restoration Project from the Trustees, the Settling Defendant shall inform the Trustees as to whether it intends to perform Long Term Monitoring and Maintenance (LTMM) on the Parcel(s) and Associated Tributaries or other area where it completed a Primary Restoration Project or pay the Trustees to perform that LTMM or neither.

If Settling Defendant elects to perform the LTMM for the Parcels on which the Primary Restoration Project was performed, the Settling Defendant shall concurrently

submit to the Trustees for approval a LTMM Plan. The LTMM Plan shall set forth the activities that will be required to maintain restored habitat over the long term including but not limited to:

Monitoring of environmental covenants (EC) shall be performed on a regular basis to insure compliance with the EC provisions.

Monitoring of restored land on a regular basis must be performed to insure that the desired habitat predominates, invasive species are not intruding on restored land, adequate vegetative cover exists, and soil is not eroding (to be defined in the Restoration Work Plan and approved by the Trustees).

Burning, mowing, or selective grazing of prairie restoration must be performed on a regular basis in order to maintain prairie vegetation (to be defined in the Restoration Work Plan and approved by the Trustees).

A schedule of maintenance (including burning, mowing or grazing), monitoring, and time-lines for undertaking any corrective measures identified as necessary by the monitoring.

Within fifteen (15) days of Trustees' approval of the LTMM Plan pursuant to Paragraph 63 of the Consent Decree, the Settling Defendant shall implement the provisions of the LTMM Plan. If monitoring detects problems with invasive species, erosion, or other problems, the Settling Defendant shall undertake measures to address these problems according to the schedule in the approved LTMM Plan.

Jasper County, Missouri Native Seed Mixes
(based on 1 acre)

Dry Planting #	Common Name	Scentific Name	Soils	Seeds in PLS lb.	% lbs of Mix	PLS lb.	Seeds in Mix
(Grasses)							
1	Side Oats Grama	*Bouteloua curtipendula*	dry	190,000	6.00%	0.66	125,400
2	Big Bluestem	*Andropogon gerardii*	dry - moist	130,000	8.00%	0.88	114,400
3	Indiangrass	*Sorghastrum nutans*	dry - moist	170,000	6.00%	0.66	112,200
4	Little Bluestem	*Schizachyrum scoparium*	dry - moist	225,008	10.00%	1.1	247,509
5	Switchgrass	*Panicum virgatum*	dry - moist	400,000	2.00%	0.22	88,000
6	Virginia Wild Rye	*Elymus virginicus*	dry - moist	75,008	6.00%	0.66	49,505
7	Canadian Wild Rye	*Elymus canadensis*	dry - moist	115,008	6.00%	0.66	75,905
					44.00%	4.84	812,919
(Forbs and Legumes)							
8	Foxglove Beardtongue	*Penstemon digitalis*	dry	2,000,000	0.20%	0.022	44,000
9	Prairie Beardtongue	*Penstemon tubaeflorus*	dry	2,888,000	0.20%	0.022	63,536
10	Skyblue Aster	*Aster azureus*	dry	1,010,000	0.25%	0.0275	27,775
11	Pale Purple Coneflower	*Echinacea pallida*	dry - av.	106,000	4.00%	0.44	46,640
12	Partridge Pea	*Chamaecrista fasciculata*	dry - av.	49,600	6.00%	0.66	32,736
13	Purple Prairie Clover	*Dalea purpureum*	dry - av.	275,008	3.00%	0.33	90,753
14	Rattlesnake Master	*Eryngium yuccifolium*	dry - av.	177,776	2.00%	0.22	39,111
15	Slender Lespedeza	*Lespedeza virginica*	dry - av.	160,000	1.00%	0.11	17,600
16	Sensitive Brier	*Mimosa quadrivalvis*	dry - av.	38,400	3.00%	0.33	12,672
17	Rough Blazing Star	*Liatris aspera*	dry - av.	192,000	1.00%	0.11	21,120
18	Goats Rue	*Tephrosia virginiana*	dry - av.	31,680	1.00%	0.11	3,485
19	Shooting Star	*Dodecatheon meadia*	dry - av.	960,000	0.50%	0.055	52,800
20	Prairie Coreopsis	*Coreopsis palmata*	dry - av.	107,520	1.00%	0.11	11,827
21	Tickseed Coreopsis	*Coreopsis lanceolata*	dry - av.	1,648,000	0.20%	0.022	36,256
22	Tall Tickseed Coreopsis	*Coreopsis tripteris*	dry - moist	169,920	1.00%	0.11	18,691
23	Blue Indigo	*Baptisia australis*	dry - moist	26,240	3.00%	0.33	8,659
24	Butterfly Milkweed	*Asclepias tuberosa*	average	67,008	1.00%	0.11	7,371
25	Golden Alexanders	*Zizia aurea*	average	176,000	1.00%	0.11	19,360
26	Gray-headed Coneflower	*Ratibida pinnata*	average	625,008	2.00%	0.22	137,502
27	Leadplant	*Amorpha canescens*	average	272,000	1.00%	0.11	29,920
28	Ashy Sunflower	*Helianthus mollis*	average	112,000	1.00%	0.11	12,320
29	White Prairie Clover	*Dalea candidum*	average	292,800	1.00%	0.11	32,208
30	Rigid Goldenrod	*Solidago rigida*	average	2,000,000	0.20%	0.022	44,000
31	Rosin Weed	*Silphium integrifolium*	average	22,400	1.00%	0.11	2,464
32	Roundhead Lespedeza	*Lespedeza capitata*	average	159,008	1.00%	0.11	17,491
33	Wild Bergamont	*Monarda fistulosa*	average	1,200,000	0.25%	0.0275	33,000
34	Wild Quinine	*Parthenium integrifolium*	average	112,000	1.00%	0.11	12,320
35	Grandiflora Coreopsis	*Coreopsis grandiflora*	average	204,000	0.50%	0.055	11,220
36	New Jersey Tea	*Ceanothus americanus*	average	136,000	0.50%	0.055	7,480

37	Ohio Spiderwart	*Tradescatia ohiensis*	average	128,000	1.00%	0.11	14,080
38	Black-eyed Suzan, Sweet	*Rudbeckia subtomentosa*	av. - moist	736,000	1.70%	0.187	137,632
39	White Indigo	*Baptisia leucantha*	av. - moist	28,000	1.25%	0.1375	3,850
40	Compass Plant	*Silphium laciniatum*	av. - moist	10,608	4.00%	0.44	4,668
41	Prairie Blazing Star	*Liatris pycnostachya*	av. - moist	13,600	4.00%	0.44	5,984
42	Illinois Bundleflower	*Desmanthus illinoensis*	av. - moist	60,000	4.00%	0.44	26,400
43	Ox-eye Sunflower	*Heliopsis helianthoides*	av. - moist	103,904	1.00%	0.11	11,429
44	Culver's Root	*Veronicastrum virginicum*	av. - moist	9,000,000	0.05%	0.0055	49,500
45	Indian Paintbrush	*Castilleja coccinea*	av. - moist	2,880,000	0.10%	0.011	31,680
46	Slender Mountain Mint	*Pycnanthemum tenuefolium*	av. - moist	5,300,000	0.10%	0.011	58,300
					56.00%	6.16	1,237,839

Moist Planting

#	Common Name	Scentific Name	Soils	Seeds in PLS lb.	% lbs of Mix	PLS lb.	Seeds in Mix
(Grasses and Sedges)							
1	Big Bluestem	*Andropogon gerardii*	dry - moist	130,000	6.00%	0.66	85,800
2	Indiangrass	*Sorghastrum nutans*	dry - moist	170,000	5.00%	0.55	93,500
3	Little Bluestem	*Schizachyrum scoparium*	dry - moist	225,008	8.00%	0.88	198,007
4	Switchgrass	*Panicum virgatum*	dry - moist	400,000	2.00%	0.22	88,000
5	Virginia Wild Rye	*Elymus virginicus*	dry - moist	75,008	5.00%	0.55	41,254
6	Canadian Wild Rye	*Elymus canadensis*	dry - moist	115,008	5.00%	0.55	63,254
7	Eastern Gama Grass	*Tripsacum dactyloides*	moist	7,504	4.00%	0.44	3,302
8	River Oats	*Chasmanthium latifolium*	moist	64,000	5.00%	0.55	35,200
9	Dark Green Bulrush	*Scirpus atrovirens*	wet	6,486,000	0.30%	0.033	214,038
					40.30%	4.43	822,356
(Forbs and Legumes)							
10	Partridge Pea	*Chamaecrista fasciculata*	dry - av.	49,600	6.00%	0.66	32,736
11	Purple Prairie Clover	*Dalea purpureum*	dry - av.	275,008	1.00%	0.11	30,251
12	Blue Indigo	*Baptisia australis*	dry - moist	26,240	2.00%	0.22	5,773
13	Tall Tickseed Coreopsis	*Coreopsis tripteris*	dry - moist	169,920	1.00%	0.11	18,691
14	Butterfly Milkweed	*Asclepias tuberosa*	average	67,008	2.00%	0.22	14,742
15	Golden Alexanders	*Zizia aurea*	average	176,000	1.00%	0.11	19,360
16	Gray-headed Coneflower	*Ratibida pinnata*	average	625,008	2.00%	0.22	137,502
17	Leadplant	*Amorpha canescens*	average	272,000	1.00%	0.11	29,920
18	Ashy Sunflower	*Helianthus mollis*	average	112,000	1.00%	0.11	12,320
19	White Prairie Clover	*Dalea candidum*	average	292,800	3.00%	0.33	96,624
20	Rigid Goldenrod	*Solidago rigida*	average	2,000,000	0.50%	0.055	110,000
21	Rosin Weed	*Silphium integrifolium*	average	22,400	1.00%	0.11	2,464
22	Roundhead Lespedeza	*Lespedeza capitata*	average	159,008	2.00%	0.22	34,982
23	Wild Bergamont	*Monarda fistulosa*	average	1,200,000	0.25%	0.0275	33,000
24	Wild Quinine	*Parthenium integrifolium*	average	112,000	2.00%	0.22	24,640
25	Grandiflora Coreopsis	*Coreopsis grandiflora*	average	204,000	0.75%	0.0825	16,830

26	New Jersey Tea	*Ceanothus americanus*	average	136,000	1.00%	0.11	14,960
27	Ohio Spiderwart	*Tradescatia ohiensis*	average	128,000	1.00%	0.11	14,080
28	Black-eyed Suzan, Sweet	*Rudbeckia subtomentosa*	av. - moist	736,000	1.70%	0.187	137,632
29	White Indigo	*Baptisia leucantha*	av. - moist	28,000	3.00%	0.33	9,240
30	Compass Plant	*Silphium laciniatum*	av. - moist	10,608	6.00%	0.66	7,001
31	Prairie Blazing Star	*Liatris pycnostachya*	av. - moist	13,600	6.00%	0.66	8,976
32	Illinois Bundleflower	*Desmanthus illinoensis*	av. - moist	60,000	4.00%	0.44	26,400
33	Ox-eye Sunflower	*Heliopsis helianthoides*	av. - moist	103,904	3.00%	0.33	34,288
34	Culver's Root	*Veronicastrum virginicum*	av. - moist	9,000,000	0.10%	0.011	99,000
35	Indian Paintbrush	*Castilleja coccinea*	av. - moist	2,880,000	0.20%	0.022	63,360
36	Slender Mountain Mint	*Pycnanthemum tenuefolium*	av. - moist	5,300,000	0.10%	0.011	58,300
37	Maryland Senna	*Senna marilandica*	av. - moist	27,200	6.00%	0.66	17,952
38	Blue Vervain	*Verbena hastata*	moist	100,000	2.00%	0.22	22,000
39	Cup Plant	*Silphium perfoliatum*	moist	22,400	6.00%	0.66	14,784
40	Cardinal Flower	*Lobelia cardinalis*	moist - wet	4,800,000	0.10%	0.011	52,800
					59.70%	6.57	1,137,621

Thoughts:

1. **Use local ecotype only seed.** Preferably from southwest Missouri, but from nearby counties in Kansas or Oklahoma would be okay.

2. Plant a diverse forb-rich mix attempting to have a grass to forb ratio of 40:60; otherwise, grasses will domimant the stand. The 40:60 ratio refers to the ratio of grass to forb seeds, **not** the ratio of grass to forb pounds. In the Dry Planting Mix above, the ratio is 39.6 to 60.4 or 812,919 grass seeds to 1,237,839 forb seeds.

3. Species selected for the mix have been historically found in Jasper County and documented in Steyermark's "Flora of Missouri".
   Attempt to have at least 5 different species of grasses and 30 species of forbs and legumes in a mix for as much diversity as possible.
   Vendors may not have all species listed.
   Substitutions may be made provided they historically occurred in Jasper County (see Steyermark), are soil appropriate, and local eco-type.
   If needed, the "dry - av." species from the Dry Planting Mix can be substituted in the Moist Planting Mix.
   (ie. Partridge Pea, Purple Prairie Clover)
   "% lbs of Mix" can be adjusted to obtain the desired number of seeds in the mix for each species.

4. Attempt to obtain a seeding rate of 40 - 50 seeds per square foot. ~ 11 lbs. per acre will usually achieve this rate.
   In the Dry Planting Mix above, the seeding rate is ~ 47 seeds per square foot (2,050,758 seeds divided by 43,560 sq. ft)

5. Above mixes are based on a 1 acre seeding area, using cleaned seed.
   Multiply the "PLS lbs" by the acres to be planted to obtain required seed amounts for larger areas.

6. The above mixes are only a start and will probably be modified according to vendor/seed availability and price. The mixes are a good start and will give vendors something to work with. The Grow Native vendors in Missouri can easily take these mixes and make needed recommendations/modifications if there are availability or price issues.